Valley
POWER SYSTEMS, INC.

AUTHORIZED DISTRIBUTOR
ELECTRO-MOTIVE

NEW 144-AUTO FERRIES PROJECT
4420 14TH AVENUE NW – SEATTLE, WA 98107 Tel. 206-834-2329 Fax. 206-782-5455

4-DOC-005 Rev -
(Formerly Calculation P-0291-05)

Contract 00-6679

ENGINEERING CALCULATION

REDUCTION GEAR COOLING

Performed by: The Falk Corporation

Date: March 30, 2006

Reviewed/Approved by:

Christopher K. Lane, PE — 3/30/06 Date

October 11, 2005

PROPULSION SYSTEM CONTRACT No. 00-6679

REDUCTION GEAR DATA SHEET

REDUCTION GEAR COOLING REQUIREMENTS

Each of the Falk 44 x 14 DMH2-S Main Reduction Gears is equipped with an ITT plate and frame heat exchanger, mounted on the reduction gear Lube Oil Module. The heat exchangers are designed for operation with a closed, fresh water cooling system, chemically treated for improved heat transfer properties and corrosion protection.

Each reduction gear heat exchanger requires 40 GPM cooling water flow rate, at a maximum temperature of 85 Degrees Fahrenheit. Water side pressure drop will be 1.58 PSI through the heat exchanger at 40 GPM. Total water flow rate for both reduction gears will be 80 GPM.

The reduction gear efficiency has been estimated at 98%, or a 2% loss through the heat exchanger and to the surrounding engine room, via radiant and convective heat transfer.

Total Heat Rejection Rate per Reduction Gear :

Estimated Radiant and Convective Heat Transfer Rate =	37,000 BTU/Hr
Estimated Heat Transfer through Heat Exchanger =	268,000 BTU/Hr
Total Heat Rejection Rate per Reduction Gear = (Based on previous experience of 98% efficiency at 6000 HP)	**305,000 BTU/Hr**

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